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65 Classification and modelling of non-extractable residue (NER) formation from pesticides in soil

M. Kästner Helmholtz centre for environmental research - UFZ / Department of Environmental Biotechnology; K.M. Nowak, RWTH Aachen University / Institute for Environmental Research Biology V; A. Miltner; S. Trapp, Danmark Tekniske Universitet / DTU Environment; A. Schaeffer, RWTH Aachen University / Institute for Environmental Research. This presentation provides a comprehensive overview about the formation of non-extractable residues (NER) from organic pesticides and contaminants in soil and tries classifying the different types. Anthropogenic organic chemicals are deliberately (e.g. pesticides) or unintentionally (e.g. polyaromatic hydrocarbons [PAH], chlorinated solvents, pharmaceuticals) released in major amounts to nearly all compartments of the environment. Soils and sediments as complex matrices provide a wide variety of binding sites and are the major sinks for these compounds. Many of the xenobiotics entering soil undergo turnover processes and can be volatilised, leached to the groundwater, degraded by microorganisms or taken up and enriched by living organisms. Xenobiotic NER may be derived from parent compounds and primary metabolites that are sequestered (sorbed or entrapped) within the soil organic matter (type I) or can be covalently bound (type II). Both types may pose a considerably environmental risk of potential release. However, NER resulting from elevated biodegradation, which means the conversion of carbon (or nitrogen) from the compounds into microbial biomass molecules during microbial degradation (type III, bioNER), do not pose any risk. Experimental and analytical approaches to clearly distinguish between the types are provided and a model to prospectively estimate their fate in soil is proposed.